PASSAIC RIVER STUDY AREA

RI/FS Work Plans

Field Sampling Plan and Feasibility Study Work Plan

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Field Sampling Plan

for the

Passaic River Study Area

January 1995

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1.0
INTRODUCTION

This Field Sampling Plan (FSP) serves as the Sampling and Analysis Plan (SAP) and has been prepared pursuant to Section VII, Paragraph 35 of the Administrative Order on Consent Index No. II-CERCLA 94-0117 (AOC) in the matter of the Passaic River Study Area[1]. This FSP has been prepared in accordance with the requirements of Section B.3.b of the Statement of Work (SOW) (Appendix I of the AOC).

The FSP describes the data to be collected during implementation of field work specified in the Investigation Work Plan (IWP). The FSP provides guidance for the field work by defining in detail the sampling and data gathering methods to be used. As specified in Section B.3.b of the SOW, the FSP specifies the location in the IWP of maps and provides tables depicting sampling and data collection locations, and a detailed description of sampling, analysis, and testing to be performed, including sampling methods, and testing methods.

Other items specified in Section B.3.b of the SOW but contained in other parts of the Remedial Investigation Work Plan (RIWP) include a detailed description of analytical methods which is contained in the Quality Assurance Project Plan (QAPP). A discussion of how the sampling, analysis, and testing will produce data useful for implementation of the Work, and estimated milestones for implementation of the Work are included in the IWP.

[1] The Passaic River Study Area (also referred to as the Site) is that portion of the Passaic River from the abandoned ConRail Railroad bridge (located approximately 4000 feet upriver from the red channel junction marker at the confluence of the Hackensack and Passaic Rivers) to a transect six miles (31,680 feet) upriver of this bridge.

A description of the Passaic River Study Area and surrounding areas including a discussion of the Site background and physical setting are included in the IWP. The rationale developed to address the goals of the Remedial Investigation (RI) as presented in Section A of the SOW is described in the IWP. In order to address the first and third goals, field data are required. Four field tasks have been identified to collect the data identified in the IWP. The field tasks planned for the field investigation are as follows:

- Task 1 - Core Borings for Chemical and Geotechnical Characterization
- Task 2 - Bathymetric Surveying
- Task 3 - Velocity Measurement and Suspended and Bed Load Sampling
- Task 4 - Piezocone Investigation

Following a short description of general field procedures, each of these tasks is discussed in a subsection of Section 3.0 of the FSP. Each section identifies the specific data needs and sampling objectives of the field task, the sample location and frequency, the sample designation, the sampling methods and procedures to be used, and the sample analyses and testing to be performed. Mobilization/demobilization, decontamination, and data management are also discussed in this FSP. The Standard Operating Procedures (SOPs) applicable to this project can be found in Appendix A of this FSP.

2.0
GENERAL FIELD PROCEDURES

2.1 MOBILIZATION/DEMOBILIZATION

Subsequent to approval by EPA of the RIWP, pre-mobilization activities will commence which include items such as subcontractor selection and contracting, equipment specification and procurement, and staffing and task planning. Mobilization of equipment and personnel for field sampling will be undertaken prior to commencement of the field sampling activities specified in the FSP. Mobilization will include mobilization of personnel, supplies, equipment, and subcontractors to the Site.

Demobilization of each subcontractor will occur upon completion of their assigned tasks. Equipment leaving the Site will require decontamination prior to departure in accordance with SOP No. 2, Decontamination.

2.2 SITE FACILITIES

A location for the storage and staging of equipment and land based vehicles during the field investigation will be maintained. This location will include decontamination facilities, sample handling facilities and storage facilities. Access to this location will be controlled. No one shall enter the area without appropriate authorization. Water craft vessels will be moored either at one of the nearby marinas or docked at a floating dock adjacent to 80/120 Lister Avenue properties.

2.3 HEALTH AND SAFETY

Health and safety requirements applicable to all persons entering the secured location or involved in the Passaic River Study Area investigations are described in the Health and Safety/ Contingency Plan (HASCP). The HASCP describes personnel medical requirements, known hazardous substances at the Site, exposure limits, personnel protection requirements, work zones and contingency plans for the Passaic River Study Area investigation.

2.4 DECONTAMINATION FACILITY

A facility will be set up for decontamination of equipment used in the field investigation. The decontamination area will be located in the same general area as the storage/staging area.

3.0
FIELD TASKS

3.1 TASK 1 - CORE BORINGS FOR CHEMICAL AND GEOTECHNICAL CHARACTERIZATION

As specified in Section 5.0 and 7.0 of the IWP, collection and analysis of sediment samples from the Passaic River Study Area are required to satisfy various goals and requirements of the SOW which includes the evaluation of certain remedial technologies and alternatives in the Feasibility Study (FS). This Section (3.1 Core Borings) discusses the data needs and sampling objectives, sampling locations and frequency, sample designations, sampling methods and procedures, and sample analyses and testing. In addition, the useability of estimated data for chemical analyses is also discussed.

3.1.1 Data Needs and Sampling Objectives

Based on the rationale presented in both the IWP and Feasibility Study Work Plan (FSWP), sediment core borings are needed to fulfill data needs to meet three sampling objectives: chemical and radiodating characterization of sediments, geotechnical characterization for sediment mobility modeling, and geotechnical characterization for remedial technology evaluation. Each of these objectives is discussed below.

3.1.1.1 Chemical Characterization of Sediments

The first goal of the Work to be performed in the Passaic River Study Area RI as stated in Section A.1 of the SOW is to "Determine the horizontal and vertical distributions and concentration of PCDDs, PCDFs, PCBs, PAHs, pesticides and metals from Passaic River sediments from the Passaic River Study Area..." In order to identify the distribution and

concentrations of chemicals within the sediments to meet the objectives of the remedial investigation, core borings are needed and samples collected (and homogenized) from several depths within each core, representing the estimated decades 1940-50, 1950-60, 1960-70, 1980-bottom of the biologically active zone (BAZ), and a surface sample representing the BAZ. Cores will be continuous so that the entire vertical profile within the sampled depth is represented by the samples. Section B.3.a.i.(5) of the SOW also requires that an additional sample be collected from the depth interval representing the period 1955-65.

To identify chemical concentrations related to date of deposition, historic bathymetry data collected by U.S. Army Corps of Engineers (USACE) have been used to identify historic sediment surfaces within the river. These bathymetry data have been used to interpolate decade sediment surfaces relative to Mean Low Water (MLW) for 1950, 1955, 1960, 1965, 1970, and 1980. The process by which the decade sediment surfaces and corresponding decade intervals within each core were estimated is explained in Section 5.0 of the IWP, and the depths (relative to MLW) for the decade intervals are presented in this FSP. A depth to sediment measurement will be collected at the time of each core boring so that the interpolated decade sediment surfaces specified in this FSP can be converted to a depth relative to top of core.

Sediment samples sampled in the cores will be homogenates of sediment throughout the decade interval starting from the 1940-1950 decade through the 1950-1960, 1955-1965, 1960-1970, 1970-1980 decades and then the 1980-bottom of the biologically active zone interval. The BAZ is defined as the upper 6-inches of sediment. The decade intervals relative to MLW for each core boring have been selected as detailed in Section 5.0 of the IWP. These samples will be analyzed for the analyte groups listed below. In order to evaluate the dates of deposition associated with the decade intervals selected and submitted for chemical analysis, radio-chemical samples will be sampled from each core and analyzed for ^{210}Pb, ^{137}Cs, and ^{7}Be, as specified below in Section 3.1.5.

The analytical chemistry and radio-chemistry data will be used to evaluate contaminant distribution and concentration for use in risk assessment and evaluation of possible need for remedial action.

3.1.1.2 Geotechnical Characterization of Sediments for Sediment Mobility Modeling

The third goal of the Work to be performed in the Passaic River Study area RI as stated in Section A.3 of the SOW is to "Determine contaminated sediment transport within the boundaries of the Passaic River Study Area..." In order to evaluate and predict the potential for sediment movement from the bed of the Passaic River at the Site, collection of certain geotechnical data is required for input into the TABS-2 model package which includes the transport code STUDH. Sediment movement depends on many factors including sediment characteristics such as grain size distribution, cohesiveness and clay properties (Atterberg limits), erosion rate, wet bulk density and shear strength. In order to measure these parameters (with the exception of shear strength), and evaluate the geotechnical characteristics of the sediments, sediment core borings will be collected from the Sediment Transport Model Area and samples will be collected at changes in the sediment characteristics (as detected by visual observation of the core lithology) of each core obtained for geotechnical characterization purposes. These samples will be tested for the geotechnical parameters specified in Section 3.1.5 of this FSP. Shear strength will be measured in situ using the piezocone as described in Section 3.4 of this FSP. As described in Section 7.0 of the IWP, the geotechnical data will be used as input to the hydraulic and sediment transport models.

3.1.1.3 Geotechnical Characterization of Sediments for Remedial Technology Evaluation

Performance of a Feasibility Study (FS) in conformance with an EPA-approved FS Work Plan (FSWP) is required by Section VII, Paragraph 42 of the AOC. To assist in the

evaluation of potential remedial technologies and alternatives in the FS, certain geotechnical characteristics of sediments will be measured. In addition to those sediment characteristics discussed above, properties such as dry density and compressibility are needed. In order to measure these parameters, sediment core borings will be conducted within the Passaic River Study Area and samples will be collected at changes in sediment characteristics. The core borings and samples collected will be the same as those collected for sediment mobility modeling (with the exception of transect -1) discussed above. These samples will be tested for the geotechnical parameters specified in Section 3.1.5 of this FSP.

3.1.2 Sampling Locations and Frequency

3.1.2.1 Chemical Characterization

Pursuant to requirements of Section B.3.a.i(1) of the SOW, core borings for chemical characterization will be done along transects spaced approximately 1200 feet apart with 3 core borings per transect. As discussed in Section 5.0 of the IWP, a total of 26 transects have been selected for a total of 78 sediment cores. The three sediment cores are to be taken along each of 26 transects in the left channel bed, the middle section (thalweg), and the right channel bed.

Specific locations were selected pursuant to the above SOW specifications and rationale developed in Section 5.0 of the IWP. Surface locations for 78 core borings (easting and northing) in State Plane Coordinates are presented in Table 3-1. The 78 core boring locations are shown in plan view on Figures 5-1 through 5-5 of the IWP. Section B.3.a.i.(3) of the SOW specifies an additional ten (10) core borings to be located at a later date. These additional ten core borings are not addressed further in this FSP (see Section 4.0 of the IWP for more information pertaining to these additional core borings).

3.1.2.2 Geotechnical Characterization

Surface locations for 33 sediment cores to be used for geotechnical characterization for sediment mobility modeling and 30 sediment cores for remedial technology evaluation are presented in Table 3-2. The 33 locations are situated along 11 transects with three core borings in each transect. Ten (10) transects and the core borings within those 10 transects are coincident with 10 of the 26 transects specified for chemical characterization borings. The eleventh transect (Transect -1) is located approximately 2,100 feet south of the Study Area boundary. The 33 core boring locations are shown in plan view on Figures 5-1 through 5-5 of the IWP.

3.1.3 Sampling Methods

In order to collect sediment samples to meet the data needs and project objectives, the vibracoring method of core boring will be used. The vibracoring operation will be performed in accordance with SOP No. 4, Sediment Sampling Over Water Using Vibracore, and will be conducted from a survey vessel capable for deployment of the vibracorer and for the installation of the vibracorer and ancillary equipment. Prior to commencement of taking a vibracore, the positioning of the vibracoring vessel on-site and the recording of vibracoring locations will be conducted in accordance with SOP No. 6, Vibracoring and Piezocone Vessel Positioning.

Vibracoring is the process of obtaining a continuous well-preserved sediment sample from a water-saturated, unconsolidated sediment. Penetration of the core tube is achieved by inducing vibrations to the core tube which reduces the frictional resistance in the adjacent sediment and which also applies a downward force to overcome frontal resistance. The vibrations are applied by a vibratory head secured to the top of the core tube. The vibratory head and core tube may be mounted within a buoyant or rigid frame to provide additional stability during deployment and operation of the vibracorer.

An A-frame or crane deployment system is used to lower and retrieve the vibracoring unit, and return it to the deck of the vibracoring vessel.

As many as three different cores will be collected at some locations following the procedures outlined in SOP No. 4, Sediment Sampling Over Water Using Vibracore. For chemical characterization, sediments will be retained in a polybutyrate plastic liner of nominal 4 inches outer diameter (OD). For geotechnical characterization, sediments will be retained in an aluminum core liner of nominal 2 inches OD. The different cores collected at any given core boring location will be co-located and offset within 10 ft of each other.

Prior to the coring operation for chemical characterization, the polybutyrate liner is inserted into a stainless steel core barrel which is mounted onto the vibrating head of the corer. The polybutyrate core liners will be used for all cores which are designated for chemical analysis. Polybutyrate liners are preferable to Teflon or stainless steel liners as they are translucent rather than opaque allowing for determination of the adequacy of core recovery and are less expensive and more readily available. The outer portion of sediment will be removed from the sediment cores prior to obtaining samples for chemical analysis and, therefore, sediments which have come in contact with the core liners will not be included in the samples sent to the laboratory for chemical analysis. Rinsate blank samples of the decontaminated polybutyrate core liners, collected during the 1991 through 1993 sediment sampling, indicated that these liners would not be expected to contribute significant quantities of any of the chemicals being analyzed. For geotechnical cores, a thin-walled aluminum core tube is mounted directly onto the vibrating head of the vibracorer. Vibracoring equipment will have the capability of recovering a core length of up to 30 feet. The depth of penetration will be measured by a penetrometer system mounted onto the vibracorer frame. To facilitate retention of the cored sediments, the end of the core tube is fitted with a stainless steel core-retainer and core nose assembly and at the top of the core a water-escape one-way valve helps

maximize core retention by allowing egress of water. The water escape valve prevents pressure build-up during penetration while also providing some suction to the sediments in the polybutyrate liner. The one-way valve also helps reduce the mixing of the upper, more fluid, sediments.

On completion of the coring the vibracorer is returned to the deck of the vibracoring vessel and the core tube, containing the core liner and recovered sediment, is removed to the core extraction table. The core liner is extruded from the core tube, sectioned and capped for transfer to the onshore core processing facility, and is processed in accordance with SOP No. 8, Core Sample Processing.

3.1.4 Sample Designations

Each of the 81 (3 cores are geotechnical only - see Table 3-2) core boring locations will have a core location designation as listed in Tables 3-1 and 3-2 (locations 201 through 281). Since more than one core boring will be collected at each core boring location (i.e., one for chemical characterization, one for additional material if needed for the BAZ, and at 33 of the 81 locations, one for geotechnical characterization), a suffix (A, B, C etc) will be assigned in sequence to each successive core collected at any given core boring location.

Individual sample numbers for each core will be assigned as described in SOP No. 1 - Containers, Preservation, Handling and Tracking of Samples for Analysis. The use of suffices (A, B, or C) to designate multiple cores at a given coring location will be assigned as described in SOP No. 8.

3.1.5 Sample Analyses and Testing

3.1.5.1 Chemical Characterization

Sample interval selection for chemical and radiochemical analyses is based upon depth intervals in each core that are representative of interpolated ranges of years. For most sampling these ranges correspond to decade intervals. A total of 78 cores are planned to be collected, and it is anticipated that samples will be taken from depth intervals representing the specified sampling intervals. The frequency and selection criteria for sample selection varies for chemical and radiochemical analyses.

Sample interval selection for the chemical and radiochemical analyses is described in SOP No. 9, Core Sample Interval Selection. Based on requirements expressed in Section B.3.a.i(2), (5), and (6) of the SOW, and the rationale presented in the IWP, sample intervals for chemical analyses for each of the 78 cores are listed in Table 3-3. This table lists the sample interval top and bottom relative to MLW and lists the estimated total depth (TD) of each core.

The sampling and analysis program will include collection and analysis of field Quality Control (QC) samples. The frequency of collection and type of QC samples are discussed in the Section 9 of the QAPP, and tabulated in QAPP Tables 9-1 (Field QC Samples) and 9-2 (Frequency of Collection of Field QC Samples). Designation of required QC samples will be sample specific and will be made prior to commencement of the vibracoring program.

For the chemical analyses, a maximum of 7 specified sampling intervals will be sampled, representing the years from 1940-1950, 1950-1960, 1955-1965, 1960-1970, 1970-1980, 1980-to the base of the BAZ and the BAZ itself. The BAZ is defined as the top 6-inches of sediment at the time of core collection. In areas of scour, or where existing